Patient outcomes following Swanson silastic metacarpophalangeal joint arthroplasty in the rheumatoid hand: a systematic overview

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Authors' objectives
To investigate the effectiveness of Swanson silastic metacarpophalangeal joint arthroplasty (SMPA) to improve hand function for patients with rheumatoid arthritis.

Searching
MEDLINE was searched for studies published in the English language between 1966 and 1999. The following keywords were used: 'arthritis, rheumatoid', 'arthroplasty, replacement', 'prostheses and implants', 'Swanson implant', 'finger joint', and 'metacarpophalangeal joint'. The bibliography of each retrieved publication was also scanned to identify further references.

Study selection
Study designs of evaluations included in the review
No a-priori inclusion criteria regarding study design were reported. Only original research studies were evaluated; review articles were excluded. Reports of biomechanical testing of Swanson implants, reports highlighting the surgical and technical execution of the SMPA procedure, and reports focusing on complications of the procedure were excluded. Because most of the articles did not specify the research design used, articles were classified as prospective studies if the studies were conceived preoperatively and patient data were collected before and after surgery. Articles were classified as clinical trials if they described a randomisation scheme in the research design. Articles were classified as retrospective studies if they did not fit the above criteria. Where reported, the mean follow-up for included studies ranged from 0.25 to 16 years.

Specific interventions included in the review
SMPA procedures. Reports of implants used in locations other than finger metacarpal joints were excluded.

Participants included in the review
Patients with rheumatoid arthritis.

Outcomes assessed in the review
No a-priori inclusion criteria regarding outcome measures were reported. Hand biomechanic outcomes (e.g. finger range of motions (ROM) and grip) were the principal outcome measures reported in all the studies. However, with few exceptions, because of the retrospective nature of most of the publications, preoperative values were missing. 15 studies also reported on health related quality of life outcomes (HRQL). The following 6 outcome domains were considered important for assessing HRQL outcomes after hand surgery: overall hand function; activities of daily living; pain; work performance; aesthetics; and patients satisfaction. Most outcome evaluations reported by included studies were based on either subjective assessment by the surgeons or unvalidated questionnaires that surveyed patients regarding satisfaction.

How were decisions on the relevance of primary studies made?
The authors do not state how the papers were selected for the review, or how many of the reviewers performed the selection.

Assessment of study quality
The authors did not state that they assessed validity, although some aspects relating to the validity of the included studies were discussed in the text, such as the use of unblinded outcome assessors, the lack of control groups, and short follow-up times.
Data extraction
The data were abstracted by two of the investigators who had training in clinical epidemiology. Where there was disagreement between abstractors, differences were resolved by consensus. The following data were extracted: reference details, study design, number of participants and their sex, total number of hands, total number of implants, and mean follow-up time. However, it was reported that some data from included articles were consistently missing e.g important patient characteristics, which may have significant prognostic value, were often not reported.

Methods of synthesis
How were the studies combined?
Outcome data from each study were pooled, wherever possible, using a weighted average.

How were differences between studies investigated?
Differences between the studies were discussed in a narrative.

Results of the review
20 studies with a minimum of 802 patients (2 studies did not report the number of participants included) and, where reported a total of 506 hands being operated on (6 studies did not report the number of hands included). The total number of reported implants was 6992 (one study did not report number of implants). This included 2 clinical trials (n=712), 5 prospective cohort studies (n>63) and 13 retrospective studies (n=27).

Research design deficiencies were quite prevalent in the included studies.

However, SMPA was effective in correcting ulnar drift and improving the arc of motion of the fingers. 5 papers provided pre- and postoperative data on degree of ulnar deviation. All showed improvement ranging between 9 and 30 degrees by the last follow-up time. 10 articles presented pre- and postoperative ROM. The weighted mean ROM was 34 degrees preoperatively and 45 degrees postoperatively. Assuming homogeneity of the studies, the weighted mean improvement in ROM (weights being the number of joints) was 11 degrees (p<0.0001). 2 papers provided data on pre- and postoperative grip strength. One paper reported no significant change and the second showed a significant increase in grip strength.

Health related quality of life was improved in the domains of hand function, pain, activities of daily living, aesthetics, and satisfaction. 3 papers reported on the outcome domain pain, where no pain was reported in 54% to 100% of the patients after SMPA. 8 articles presented data in the aesthetics domain, of which 6 reported improvement in more than 80% of the patients. 6 papers presented data on patients' willingness to undergo the surgery again (satisfaction), and 4 papers reported more than 80% of the patients were willing to undergo SMPA again. No paper reported any outcome data on work performance. In Overall Hand Function scale, 10 papers provided data on patients' self-assessment of their improvement after SMPA. 60% to 96% of patients reported improvement. 7 papers provided data for the ADL scale, 4 of which reported improvement (range 52%-66%). The remaining 3 papers did not provide preoperative measurements.

Authors' conclusions
SMPA appeared to be an effective procedure in correcting rheumatoid hand deformities. Future research must establish objective, quantifiable measures of hand function improvement by using standardised hand function tests and validated hand outcome questionnaires.

CRD commentary
This was a fairly well-conducted review. The aims were clearly stated and pre-defined inclusion/exclusion criteria were reported, although the a-priori inclusion criteria regarding outcome measures and study design were not stated. MEDLINE was the only electronic database that was searched and therefore some important information may have been missed. No attempt was made to look for unpublished studies and the presence of publication bias cannot be ruled out. Information on how decisions were made on the relevancy of papers and how many reviewers were involved
in the process was not reported. A systematic procedure involving one or more reviewers was used for data extraction and relevant details of included papers were clearly presented in tables and described in the text. There was no reported structured validity assessment of included studies (such as the use of a validity checklist), although the limitation of the overall methodological quality of the studies was discussed in the text. Differences between included studies were briefly discussed and a narrative synthesis of the results was appropriate. However, for the outcome measure finger ROM it is unclear if pooling was appropriate as no formal investigation of heterogeneity was undertaken. The authors' conclusion seem to follow from the results, but should be treated with caution owing to the above limitations and the poor quality of the included studies.

**Implications of the review for practice and research**

**Practice:** The authors do not report any implications for practice.

**Research:** The authors note that future research needs to define the functional gains after SMPA using other objective hand function tests such as the Jebsen-Taylor test, which is a timed test simulating different ADL tasks (see Other Publications Of Related Interest no.1). They also noted that an outcome study is needed to assess outcomes of SMPA after almost 30 years of clinical practice. The authors concluded that future research must establish objective and quantifiable measures of hand function improvement by using standardised hand function tests and validated hand outcome questionnaires.

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